SOA Research INSTITUTE

SCOR The Art & Science of Risk

Mortality and Longevity

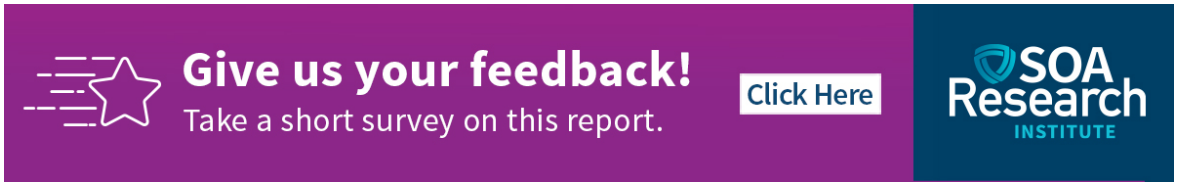
Navigating Life and Health Insurance Demand Trends

MARCH | 2024

Navigating Life and Health Insurance Demand Trends: A Global Perspective

AUTHOR Xiao Xu, FSA, CERA, FIAA, CFA, FRM, CA, CPA, PhD
Society of Actuaries Research Institute

James Lynch, FSA
Chief Data Officer
ReMark, SCOR Digital Solutions



CONTENTS

Executive Summary **4**

Section 1: Introduction **6**

Section 2: Overview of the Survey Responses **8**

2.1 Mortality, Health, and AD&D Insurance Purchase by Demographics 8

2.1.1 By Markets, Sex and Age 8

2.1.2 By Marital and Working Status 10

2.1.3 By Residential Status, Area Type and Income Level 11

2.1.4 By Education Level and Insurance Knowledge 13

2.2 Mortality, Health, and AD&D Insurance Purchasing Methods and Recent Behavior 14

Section 3: Economic Models **16**

3.1 Life Insurance Modeling 16

3.2 Health Insurance Modeling 18

Section 4: Machine Learning Models **21**

4.1 Model Development 21

4.2 Feature Influence and SHAP Insights 23

Section 5: Conclusions **30**

About The Society of Actuaries Research Institute **32**

Navigating Life and Health Insurance Demand Trends: A Global Perspective

Executive Summary

In an era where financial literacy and risk management are paramount, understanding the motivations behind life and health insurance purchases is crucial for the industry. This report explores the behavioral factors influencing insurance purchase among Gen Z and Millennials for forward-looking purposes, leveraging a rich dataset spanning 22 markets across six continents. Employing both traditional economic regression and state-of-the-art machine learning models, this study offers a dual perspective on market behaviors and purchasing trends.

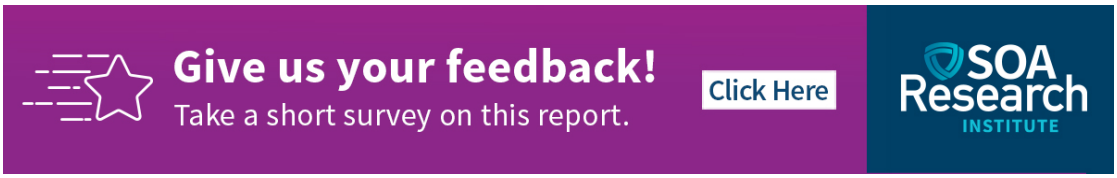
Our comprehensive study is based on data from the Global Consumer Study 2023-24, a global survey of over 12,000 individuals carried out by SCOR's Digital Solutions division. It delves into demographics, insurance preferences, personal circumstances, and digital engagement. With an analytical focus on younger generations, the findings illuminate key predictors for insurance purchase:

1. Insurance Knowledge: A foundational factor, where higher understanding correlates with increased insurance purchases.
2. Marital Status: Highlighting a trend where married individuals are more prone to purchasing life and health insurance than their single peers.
3. Employment: Demonstrating that those with full-time and part-time employment are more inclined to invest in life and health insurance.
4. Property Ownership: Linking property ownership with a higher likelihood of having insurance coverage.
5. Urban Residency: Observing that urban dwellers are more apt to purchase insurance.
6. Age Dynamics: For Gen Z and Millennials, relatively young segments of the general population, there's a trend where interest in life insurance slightly increases with age, while the inclination to purchase health insurance experiences a marginal decline.
7. Sex Preferences: Men show a predilection for life insurance, whereas women display a preference for health insurance.

The study delves into the inclination towards recent insurance purchases, particularly noting an uptick among younger generations endowed with high insurance literacy. It has been observed that individuals who have made claims are also more inclined to engage in recent purchases. This trend underscores the generations' readiness to adopt online solutions, especially those prioritizing cost efficiency and effectiveness. Among middle-aged groups, a notable interest in utilizing health apps correlates with a higher likelihood of recent insurance acquisitions.

The findings highlight a major move towards using digital methods to buy insurance, especially noticeable in major urban cities. This move to online platforms is a big change in the insurance world, requiring companies to skillfully adapt to these changes to remain relevant. This is especially important as they try to attract the growing buying power of younger generations.

In conclusion, the future trajectory of the insurance market hinges on a nuanced understanding of these evolving trends. By embracing technology-driven solutions and catering to the preferences of an informed, tech-savvy generation, insurance companies can establish a strong presence in the constantly changing market.



Section 1: Introduction

Purchasing life and health insurance is considered an important financial decision and action for planning against various types of risks. Behavioral economists and insurance companies have long tried to decipher the key drivers behind the purchase of insurance products. From an individual perspective, empirical studies have shown that one important factor influencing people's decisions to buy life insurance is financial literacy, which typically includes knowledge and understanding of life and health insurance, as well as making decisions regarding financial planning.

An individual's risk awareness and perceptions are also main motivations behind the purchase. Information sources, such as access to financial advisors and insurance agencies, also increase the propensity to purchase insurance. It has also been noted that demographic factors such as age, income, working status, and residential status, are quite strong influencers on life insurance purchase. Additionally, from the total market aggregate perspective, an aging population also increases the greater need for different life and health insurance products in different markets.

With the development of digital platforms, apps, and online services, the propensity to purchase life and health insurance is yet to be fully explored. How the purchase of one type of insurance product affects the purchase of other products remains to be discovered. This includes understanding which factors often interact with each other.

In this research report, we have focused on analyzing market research data primarily for Generation Z (born after 1996) and Millennials (born between 1981-1996) to understand their attitudes toward life and health insurance purchasing behaviors. The key question we address is whether the determinants influencing this decision-making process have shifted in the current technological landscape, which factors influence the purchasing decisions, and what key determinants drive these recent purchases of different products.

The survey data was gathered from 12,563 respondents across 22 different markets, including major countries such as the US, China, the UK, Japan, and India, to ensure a diverse range of responses. This comprehensive dataset allows us to delve into generational perspectives on life insurance, with a detailed count of responses from each market provided in Table 1. The geographic allocation can be visualized in Figure 1. For each country, over 500 responses were collected.

The survey encompasses over 200 questions, targeting a range of topics. These include demographics (country, age, sex), insurance preferences (various personal insurance types such as home, auto, pet, travel, mobile phone, and personal health or life insurance), and recent insurance purchases. Key questions also examined the personal circumstances of respondents, such as employment status, main sources of income, industry sectors of employment, marital and parental statuses, and residential situations.

Furthermore, the survey comprehensively covers the assessment of consumer behavior and digital trends. This focuses on the willingness to purchase from online-only insurance providers, the importance of factors like trustworthiness and transparency in the buying process, engagement with extended warranty offers, and reasons for refusal. Additional sections delve into lifestyle and wellness, examining aspects such as healthy living habits, average sleep hours, risk appetite, average daily steps, exercise frequency, diet quality, and aspirations for lifestyle improvements (e.g., sleep, stress management). It also explores the use of wellness tools (wearable devices, home gyms, etc.) and transportation & environment questions related to property casualty insurance, transportation methods, and living environments.

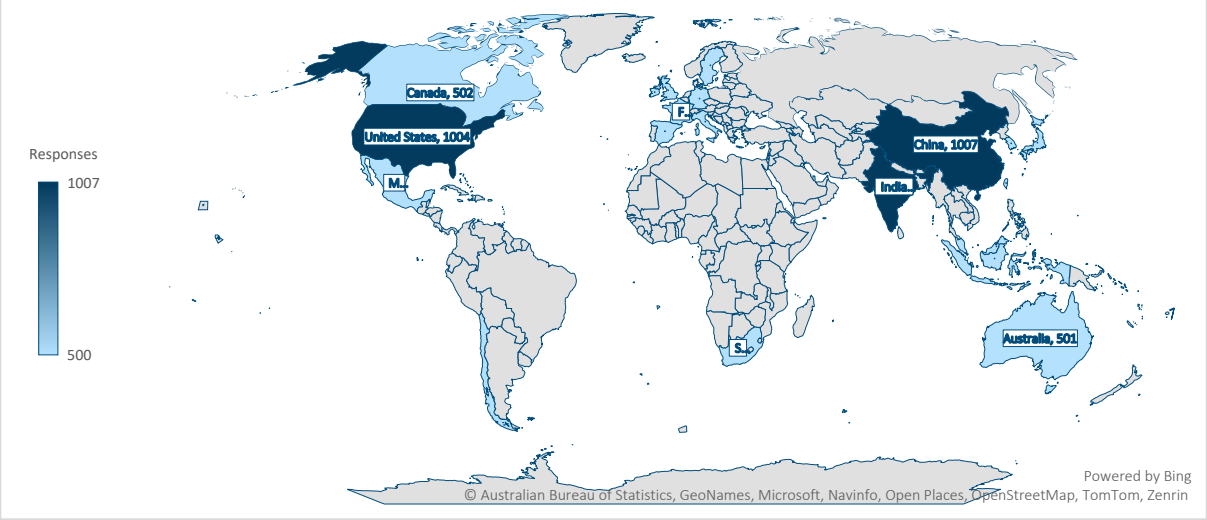
Leveraging this comprehensive dataset, the report examines the propensity to purchase life and health insurance products from a global perspective. This analysis is conducted using logistic regression economic modeling theory for a detailed statistical approach, complemented by gradient-boosted decision tree machine learning models for in-

depth insights into recent purchasing behavior. The design of this approach aims to provide valuable insights to commercial insurance providers from a marketing analytics standpoint.

Table 1
SURVEY RESPONSES BY MARKETS

Markets	Reponses
Australia	501
Canada	502
Chile	503
China	1007
France	505
Germany	501
Hong Kong	504
India	1003
Indonesia	504
Ireland	503
Italy	504
Japan	502
Malaysia	502
Mexico	503
Singapore	502
South Africa	502
South Korea	504
Spain	504
Sweden	502
Taiwan	500
UK	501
USA	1004
Total	**12563**

Figure 1
SURVEY RESPONSES BY MARKETS



Section 2: Overview of the Survey Responses

In this section, we provide a statistical summary of survey responses regarding key types of life and health insurance products. The main question asked was 'Which of the following types of personal health or life insurance do you have?' Responses for individual products were categorized as a binary variable 1 for those who have purchased insurance and 0 for those without. The survey covered three products across 22 countries and markets: the first being insurance related to mortality (whole life, term life), with 36% of respondents having this type; the second is health-related insurance (critical illness, income protection), reported by 39% of respondents; and the third is accidental death and disability (AD&D) insurance, selected by 28% of respondents globally. This section will further show a detailed breakdown of purchase rates, focusing on the factors that may impact the purchase of insurance products.

2.1 MORTALITY, HEALTH, AND AD&D INSURANCE PURCHASE BY DEMOGRAPHICS

2.1.1 By Markets, Sex and Age

In the analysis, 22 markets are grouped into different regions, represented by continents, with South Africa representing Africa, Chile as the representative of South America, and Australia as the representative for Oceania. Europe is considered as a whole due to relative similarities in market characteristics. Asian countries and North American countries are detailed individually because of the market relevance and distinction between each different market. Among the total respondents, 36% currently hold mortality-related insurance, such as traditional life policies, 39% have health insurance, and 37% hold AD&D death and disability insurance policies (as shown in Table 2). The analysis highlights the relationship between a market's propensity for purchasing life insurance and demographic factors. Although different markets may have formal definitions and categorize certain liabilities coverage into different categories, participation in the life insurance market shows significant variation, particularly among Gen Z and Millennials.

The highest purchase rates for mortality insurance policies are observed in Taiwan and Singapore, with rates of 59%. A further breakdown of these two markets reveals that among male respondents, 61% in Taiwan and 60% in Singapore reported having life insurance, which could explain the highest purchase rates across both markets. One possible reason for this high level could be the mandatory military service requirements. Regarding health-related policies, China has observed high purchase rates of 72% in the health market, indicating a flourishing landscape and dominance by critical illness products in China. The development of Chinese health insurance markets has been growing over the past two decades. AD&D death and disability products observe the highest purchase rate of 54% in Taiwan, primarily due to the general public's risk awareness and the lower premiums compared to the benefits paid. In general, Asian countries see higher purchase rates for all three types of insurance.

Table 2
INSURANCE PURCHASE BY REGIONS AND MARKETS

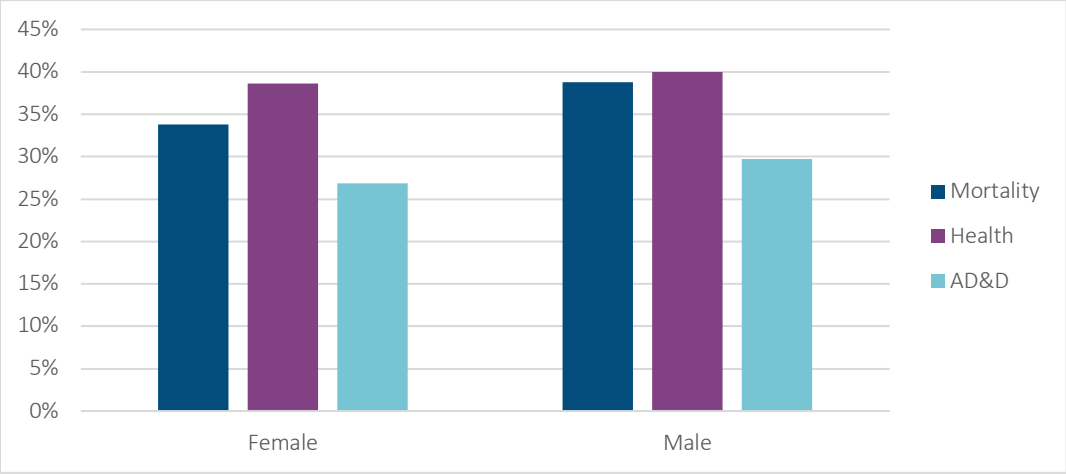
Region	Market	Mortality	Health	AD&D
Africa	South Africa	36%	31%	37%
Asia	-	46%	54%	38%
	China	41%	**72%**	48%
	Hong Kong	51%	56%	36%
	Taiwan	**59%**	59%	**54%**
	India	50%	53%	43%
	Indonesia	32%	46%	35%
	Japan	39%	29%	11%
	Malaysia	44%	51%	40%
	Singapore	**59%**	61%	46%
	South Korea	38%	45%	16%

Europe	-	28%	25%	18%
North America	-	32%	33%	23%
	USA	31%	29%	19%
	Canada	31%	41%	26%
	Mexico	34%	33%	26%
Oceania	Australia	16%	16%	12%
South America	Chile	27%	30%	24%
Total	-	36%	39%	28%

Figure 2 presents the overall purchase rates for mortality, health, and AD&D insurance among male and female respondents. Overall, males report a higher purchase rate compared to females. The smallest sex gap is observed in health insurance, whereas for mortality-related insurance, the purchase rate among male respondents is 39%, which is higher than the 34% observed for females.

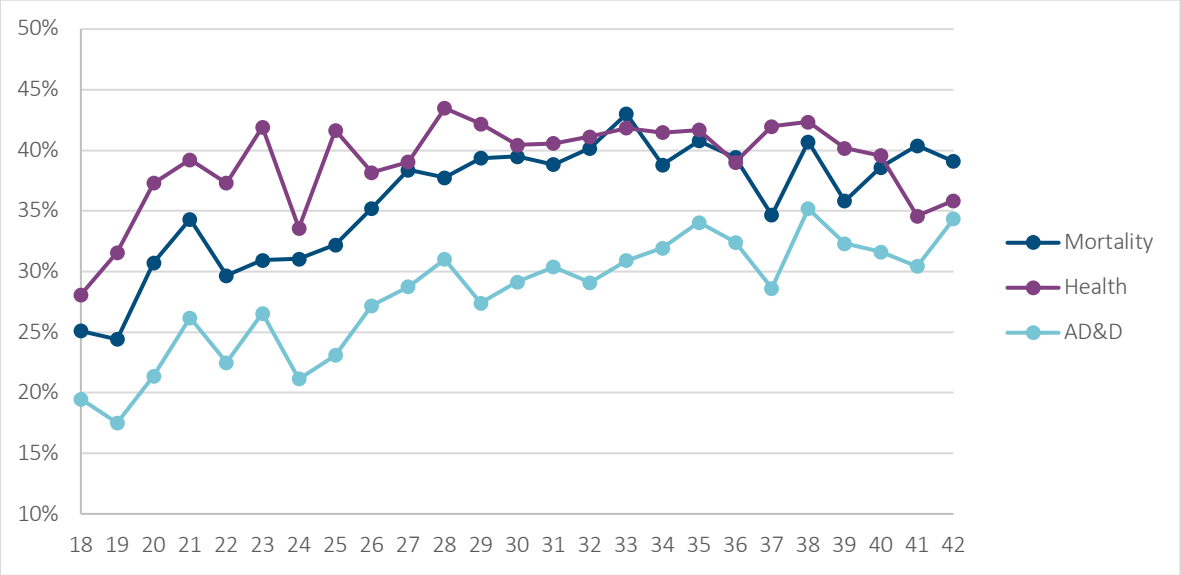
Figure 2

INSURANCE PURCHASE BY SEX



As age increases, the purchase rates for the three types of insurance—mortality, health, and AD&D—also increase, showing a higher trend. As shown in Figure 3, there is a generally linear upward trend in purchase rates as age increases across world markets. This increase is more pronounced among Gen Z individuals (ages 18-26), where the purchase rate climbs more steeply per year compared to Millennials (ages 27-42). It appears that the period between 20 and 30 years of age is critical for the development of insurance participation and risk awareness.

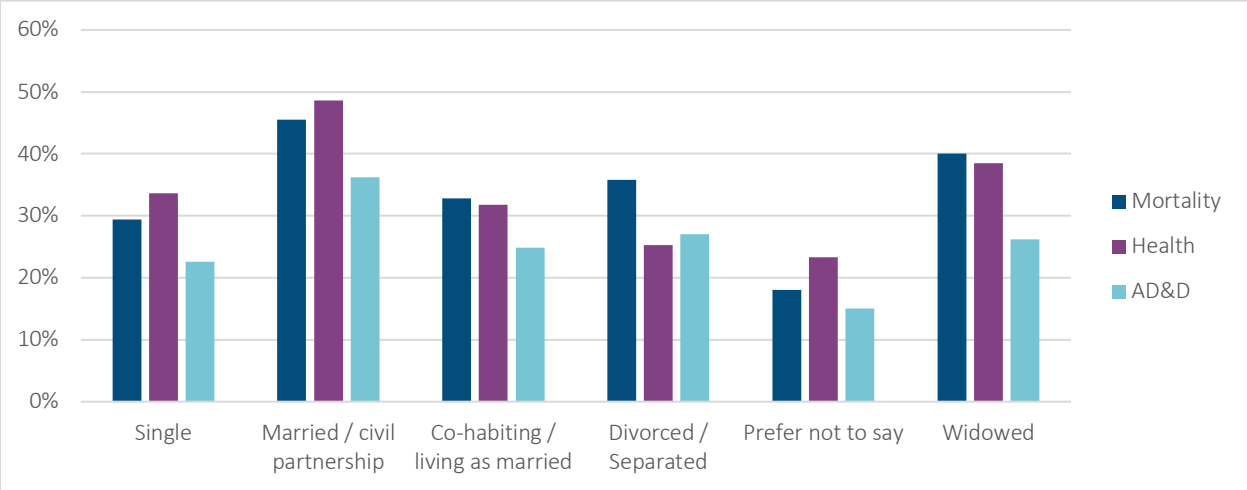
Figure 3
INSURANCE PURCHASE BY AGE



2.1.2 By Marital and Working Status

Figure 4 illustrates the influence of marital status on the purchase rates for life and health insurance. Married individuals or those in civil partnerships exhibit higher purchase rates for all three products: 45% for mortality insurance, 49% for health insurance, and 36% for AD&D insurance. This is followed by widowed participants, who also demonstrate relatively high purchase rates. In contrast, single respondents have significantly lower purchase rates than their married counterparts, at 29% for mortality, 34% for health, and 23% for AD&D insurance. The disparity in purchase rates underscores a greater propensity among married individuals to purchase life and health insurance products.

Figure 4
INSURANCE PURCHASE BY MARITAL STATUS



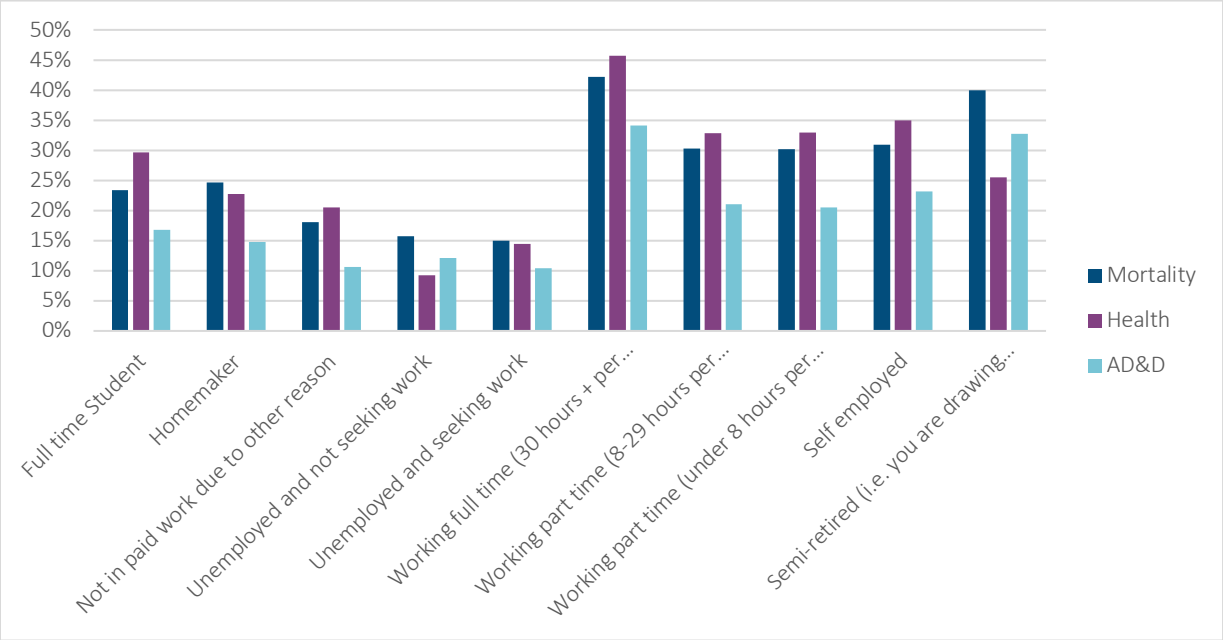
People who are actively employed typically show higher purchase rates for insurance compared to those who are unemployed. Figure 5 highlights this trend: full-time workers (30+ hours per week) have the highest purchase rate for mortality insurance at 42%, closely followed by semi-retired individuals at 40%. In contrast, the lowest purchase rates are observed among the unemployed actively seeking work (15%), the unemployed but not seeking work (16%), and individuals not engaged in paid work (18%).

Regarding health insurance, full-time workers exhibit the highest purchase rate at 46%, while those not seeking work have the lowest purchase at 9%, and the unemployed actively seeking work at 14%. The purchase rates for health insurance among other groups typically range from 20% to the mid-30s. The trend is similar for AD&D death and disability insurance, with full-time workers reporting a purchase rate of 34%. The lowest rates are noted among the unemployed actively seeking work at 10%, the unemployed not seeking work at 12%, and those not in paid work for other reasons at 11%.

The chart distinctly illustrates a marked gap in insurance purchase rates. Those who are employed lead the purchase rates by around 10%, followed by students and homemakers. The unemployed category shows the lowest rates in all three types of insurance, trailing the other groups by approximately 10%.

Figure 5

INSURANCE PURCHASE BY WORK STATUS

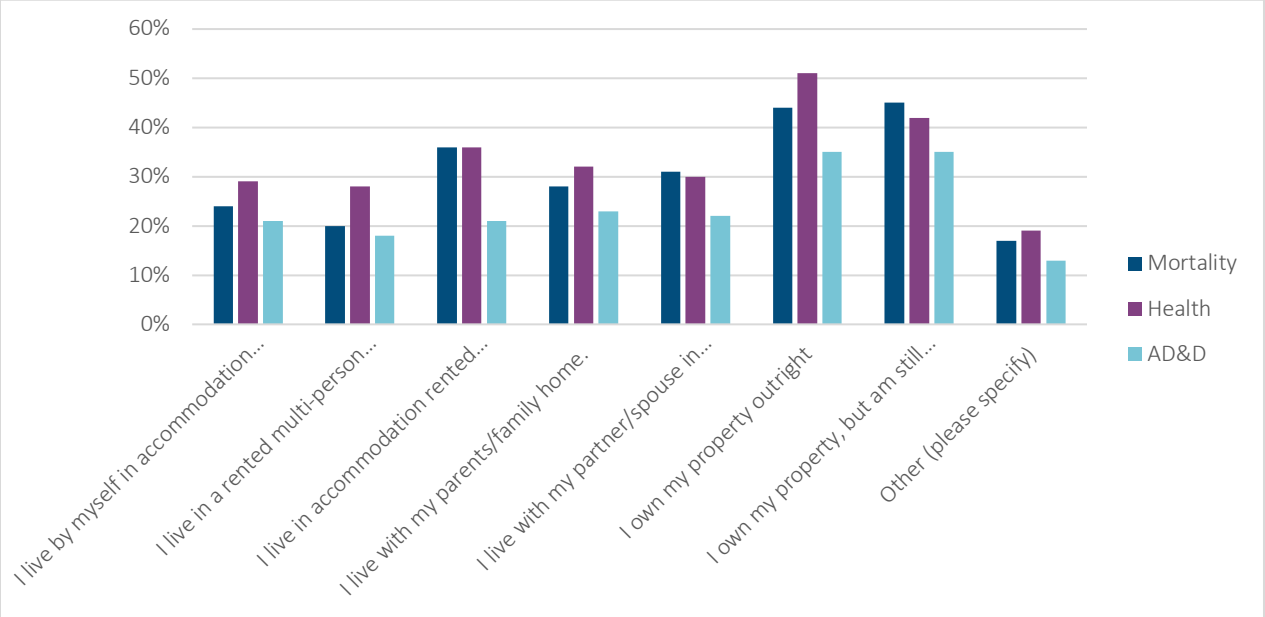


2.1.3 By Residential Status, Area Type and Income Level

The survey also collected data on participants' residential status, revealing insights into the purchase rates of life and health insurance products based on different residential situations. Figure 6 reveals that property owners, whether owning outright or through a mortgage, exhibit an average purchase rate above 40% across the three types of insurance products. This contrasts significantly with renters, whose purchase rates generally hover between 20-30%. These findings indicate a clear correlation between property ownership and an increased propensity to choose life and health insurance.

Figure 6

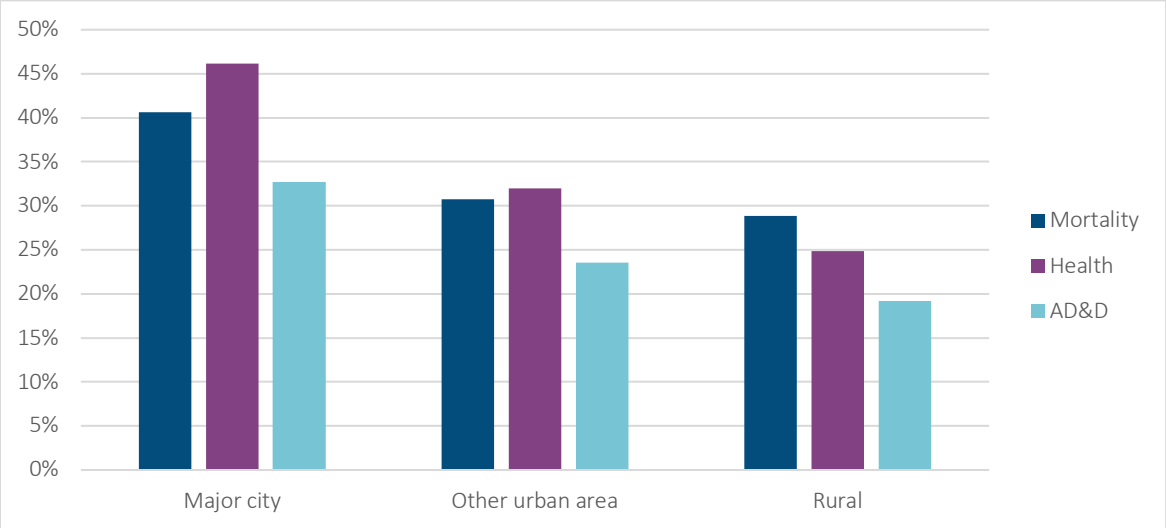
INSURANCE PURCHASE BY RESIDENTIAL STATUS



Area type is another potential influential factor on individuals' decisions to purchase various types of insurance. Among individuals residing in major city areas, about 41% select mortality insurance, 46% for health insurance, and 33% for AD&D insurance. These purchase rates decline among residents of other urban areas. In contrast, those living in rural areas exhibit even lower rates of insurance uptake, with only 29% selecting mortality insurance and a mere 25% holding health insurance policies.

Figure 7

INSURANCE PURCHASE BY AREA TYPE

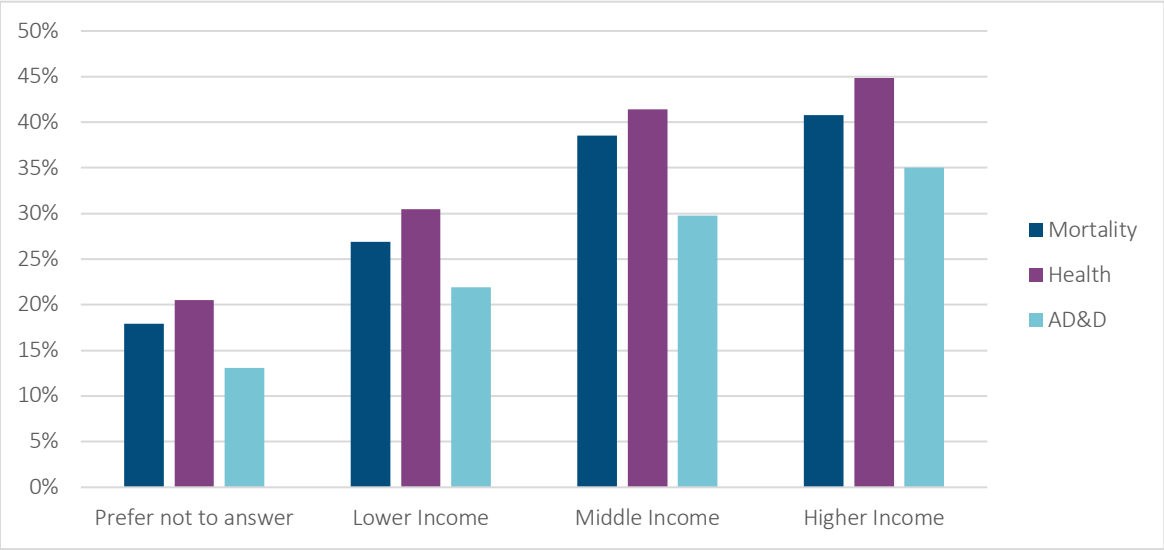


Regarding income level, different markets use various currencies to report income. Within each country, income levels are categorized into three bands: lowest, middle, and highest, based on different scenarios. Figure 8 shows that the higher income band exhibits high purchase rates for all three types of insurance products at around 40%. This is followed by the middle income group and then the lower income group. Notably, the group that prefers not

to answer displays the lowest purchase rates for all three products, all below 20% for mortality, health, and AD&D insurance. This clearly indicates income as a significant factor influencing insurance purchases.

Figure 8

INSURANCE PURCHASE BY INCOME LEVEL

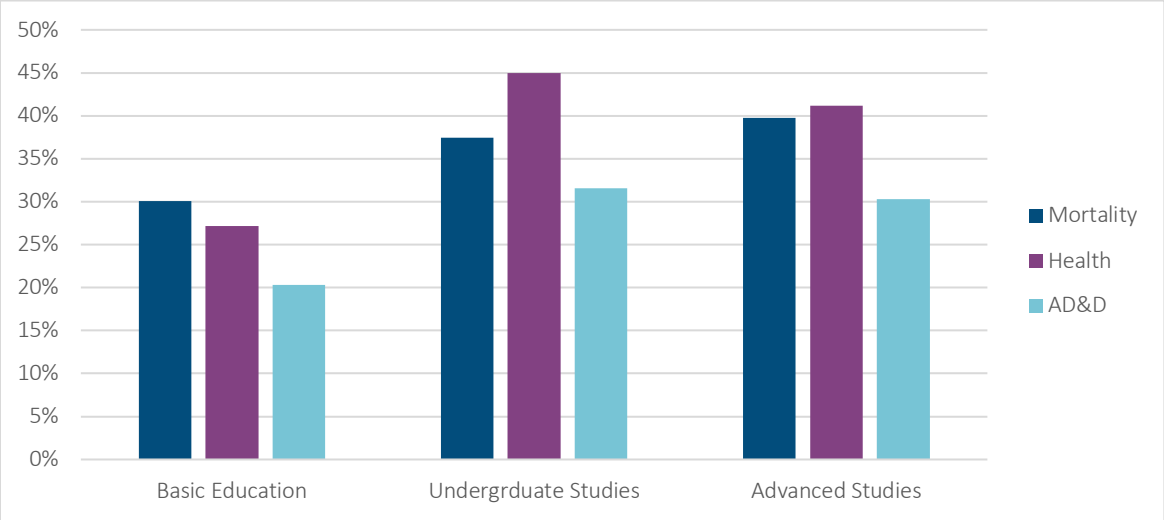


2.1.4 By Education Level and Insurance Knowledge

Compared to respondents who completed only basic education, participants with undergraduate studies and advanced studies demonstrate higher purchase rates for life and health insurance products, as shown in Figure 9. Individuals without bachelor's degrees typically show less than 30% purchase rates for all three insurance products. It is not obvious whether having advanced studies, such as postgraduate and professional qualifications, significantly influences purchase rates beyond those of undergraduate studies.

Figure 9

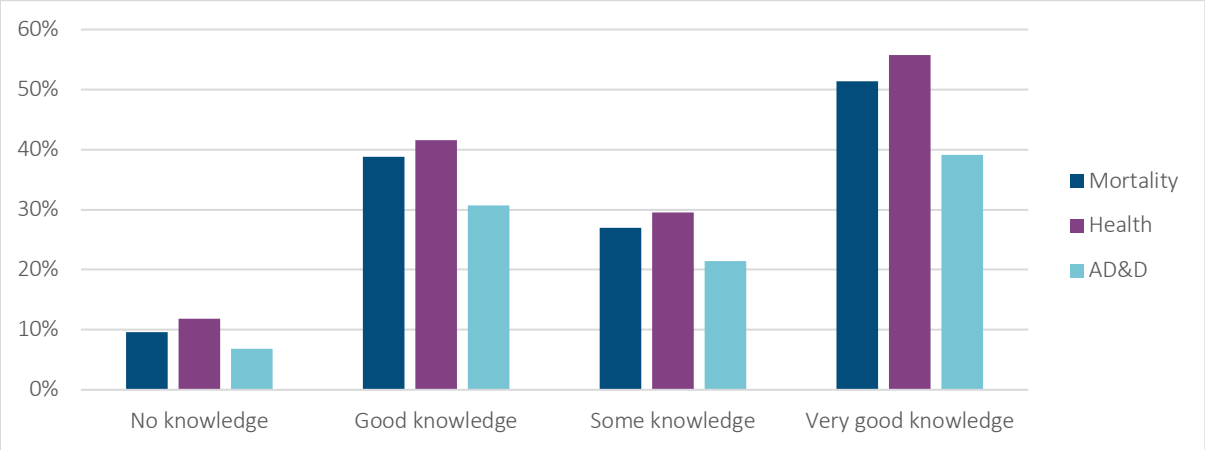
INSURANCE PURCHASE BY EDUCATION LEVEL



The survey inquired about self-reported knowledge levels of life and health insurance, categorizing responses into four brackets: very good knowledge, good knowledge, some knowledge, and no knowledge. Generally, as the

knowledge level increases, the purchase rates also steadily increase across all three products, as shown in Figure 10. Typically, respondents with very good knowledge have purchase rates above 50% in both mortality and health insurance, good knowledge around 40%, and some knowledge around 30%, while those with no knowledge have a mortality and health insurance purchase rate of only around 10%. This relationship is very strong and indicates that insurance literacy could be a determinant factor motivating people to purchase life insurance. It may also suggest a purchasing insurance could lead to increased knowledge level.

Figure 10
INSURANCE PURCHASE BY KNOWLEDGE LEVEL



2.2 MORTALITY, HEALTH, AND AD&D INSURANCE PURCHASING METHODS AND RECENT BEHAVIOR

The survey also explored the most recent methods customers used to purchase insurance. According to Table 3, individuals purchasing through intermediaries—such as advisers, aggregators, or comparison websites—select mortality insurance at a rate of 48% and health insurance at 51%. Direct purchases from insurers, whether by telephone, mail, or in-branch, are similarly prevalent, with mortality insurance purchase rates at 46% and health insurance at 51%. Direct purchases through insurers' websites are a common method for both mortality and health insurance, indicating a strong consumer shift towards digital platforms. These three purchasing methods show significantly higher purchase rates compared to others. However, for AD&D insurance, the purchase rates through intermediaries, insurers' websites, and direct methods do not exhibit a significant gap compared to other purchasing methods. This suggests that traditional life and health insurance products may require more personalized consultation or information not as readily available for AD&D insurance products.

Table 3
INSURANCE PURCHASE BY PURCHASE METHOD

	Mortality	Health	AD&D
Through an intermediary (e.g. adviser, aggregator, or comparison website)	48%	51%	37%
Through the insurer's website	45%	48%	33%
Direct from the insurer, via telephone, mail, in a branch	46%	51%	37%
Other	37%	36%	35%
Can't remember	30%	37%	24%

When participants were asked about the timing of their most recent insurance purchase, specifying whether it occurred within the last 1, 2, 3, or 4 years, Table 4 shows the insurance purchase by the time since the most recent purchase. Participants who made a purchase within the last 2 years chose mortality insurance in over 50% of cases and AD&D insurance in more than 40% of cases, while purchases for health insurance were slightly lower. This

comparison with the overall purchase rates for these three insurance types suggests that recent purchases tend to favor AD&D and mortality-related life insurance over health insurance.

Table 4

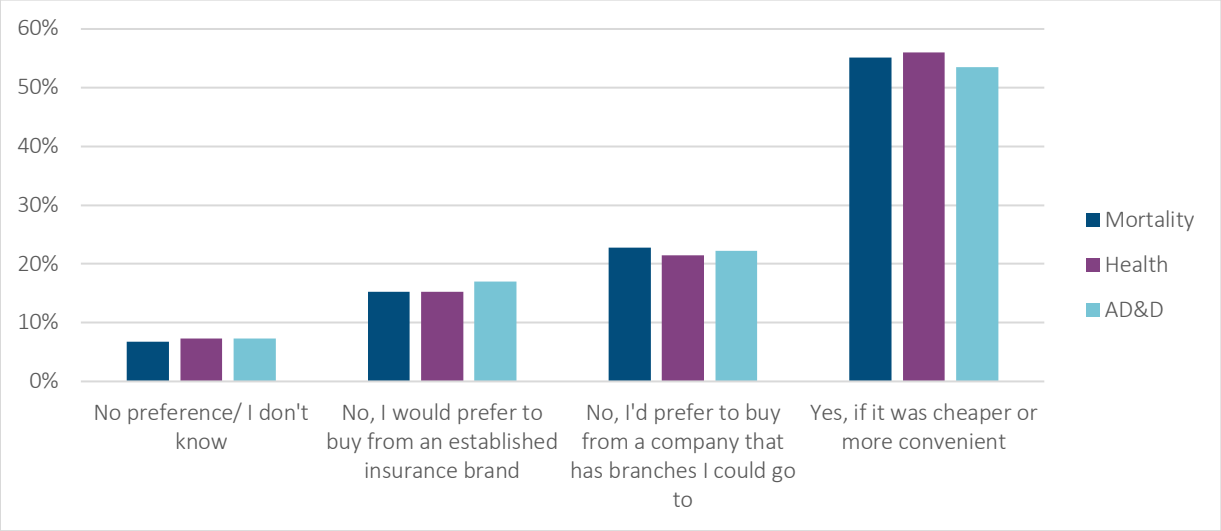
INSURANCE PURCHASE BY RECENT PURCHASE

Year	Mortality	Health	AD&D
1	53%	39%	45%
2	50%	32%	46%
3	45%	36%	45%
4	40%	30%	42%

When asked about their willingness to purchase from new online-only insurance companies, Figure 11 reveals that a significant number of respondents would consider making a purchase if it offered lower costs or more convenience. Among those who have purchased mortality, health, and AD&D insurance, more than 50% expressed interest in buying from an online-only company if it offered cheaper premiums. This highlights the price sensitivity among purchasers.

Figure 11

INSURANCE PURCHASE BY ONLINE PREFERENCES



Section 3: Economic Models

The logistic regression analysis was performed to examine the relationship between respondents' understanding of insurance and their decisions regarding life insurance purchase. The logistic regression equation is given by:

$$P(D_{\text{Insurance}} = 1) = F(\beta' X)$$

In this expression, $D_{\text{Insurance}}$ indicates whether an individual has chosen the life and health, where 1 denotes purchase. The function $F(\cdot)$ is the cumulative distribution function specific to the logistic model, and β symbolizes the coefficients and X denotes the vector of predictor variables, which includes factors such as age, marital status, educational attainment, residential setting, employment status, and income level.

3.1 LIFE INSURANCE MODELING

In the analysis, we group mortality and AD&D death disability insurance together due to the shared characteristics of the two products. The regression output results, as shown in Table 5, provide insightful details about the determinants of life insurance purchase. The logistic regression analysis reveals several significant findings. The model is statistically robust. The overall model exhibits a pseudo R-squared of 18.1%, indicating the proportion of variance in the dependent variable that is predictable from the independent variables.

Table 5
LIFE INSURANCE PURCHASE REGRESSION OUTPUT

	Coefficient	Significance
Constant	-5.04	***
Age	0.01	***
Sex	-0.08	*
Marital Status	0.27	***
Working Status	0.15	***
Residential Status	0.34	***
Area Type	0.08	**
Income Level	0.03	ns
Education Level	-0.03	ns
Insurance Knowledge	0.26	***
Direct	2.29	***
Intermediary	2.43	***
Other	2.14	***
Pseudo R-squared		18.1%

Age is a significant predictor of life insurance purchase, with each additional year increasing the likelihood of selecting life insurance. This effect is evidenced by a positive coefficient of 0.01, which is significant at the 0.001 level. Sex emerges as another significant variable at the 5% level, with a coefficient of -0.08. This negative coefficient, assigned to sex being coded as 0 for men and 1 for women, indicates that men are more likely to purchase life insurance compared to women. This finding highlights the influence of sex on life insurance decisions, underscoring the importance of demographic factors in understanding insurance behavior.

Marital status is also suggested as a significant factor, with a coefficient of 0.27, suggesting that individuals who are married or in a civil partnership are more likely to have life insurance compared to their single counterparts. Residential status is another significant predictor, with a coefficient of 0.34, indicating that individuals who own their homes or have stable living conditions are more inclined towards selecting life insurance.

Employment status, with a positive coefficient of 0.15, implies that employed individuals or those with stable work statuses tend to opt for life insurance more frequently than those who are not employed. Knowledge of insurance is

a strong predictor with a coefficient of 0.26, reflecting that a higher understanding or awareness of life insurance-related knowledge corresponds to a higher probability of life insurance uptake.

The income level shows a positive relationship but is not statistically significant at the conventional 0.05 level, hinting that income alone may not be a decisive factor in the purchase of life insurance. Similarly, educational level displays a non-significant influence on life insurance purchasing decisions.

Figure 12 displays the results of a logistic regression analysis, underscoring the notable impact of purchasing methods such as 'Direct', 'Intermediary', and 'Other' on the purchase of life insurance. The coefficients for these categories, 2.29, 2.43, and 2.14 respectively, demonstrate a strong positive relationship with the choice of life insurance. Given the significant size of these coefficients and their corresponding p-values, it's evident that the channels through which respondents purchase insurance play a critical role in their decision-making.

Figure 12

LOGISTIC REGRESSION COEFFICIENTS FOR LIFE INSURANCE

In assessing the potential multicollinearity among the predictors in our model, we referred to the Variance Inflation Factor (VIF) as a diagnostic measure. Table 6 presents the VIF values for each variable in the model. A VIF value greater than 10 is commonly used as an indicator of multicollinearity. All predictor variables demonstrate VIF values well below the threshold of 10, ranging from 1.03 to 1.23. These low VIF values indicate minimal multicollinearity among the predictors, suggesting that each variable provides unique and valuable information to the model.

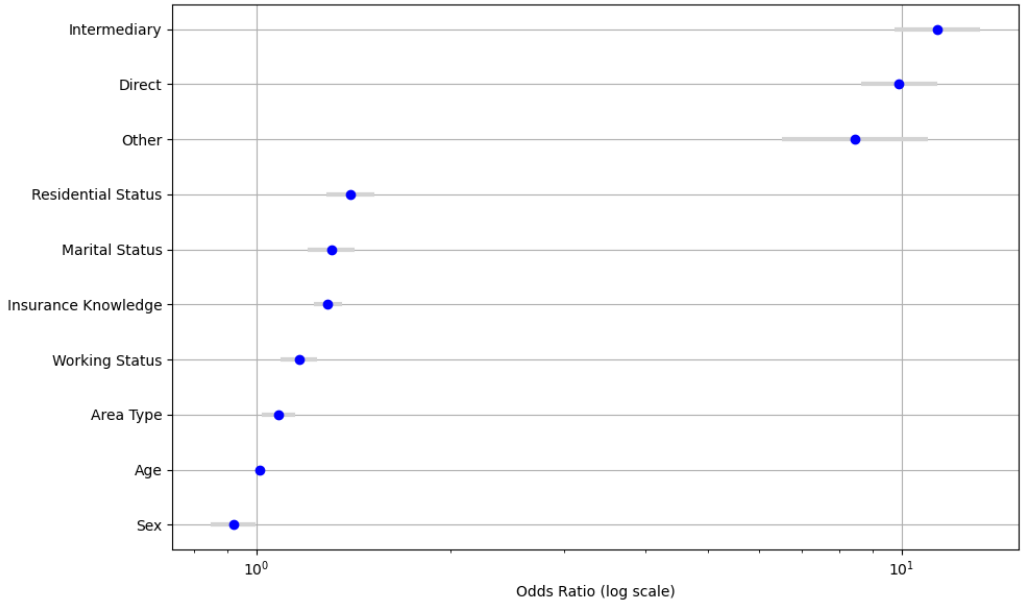
Table 6

VARIANCE INFLATION FACTOR RESULT FOR LIFE INSURANCE

Feature	VIF
Age	1.23
Sex	1.03
Marital Status	1.22
Working Status	1.14
Residential Status	1.05
Area Type	1.07
Insurance Knowledge	1.14

Figure 13 further illustrates the odds ratios and their 95% confidence intervals for various predictors, demonstrating the change in the likelihood of the outcome with a unit change in each predictor. With odds ratios above 1, factors such as insurance knowledge, residential status, working status, and marital status show an increased likelihood of the outcome. When comparing the purchasing methods, 'Intermediary' and 'Direct' purchases stand out and exhibit narrower widths in their confidence intervals than 'Other', indicating more precise estimates. This suggests that to boost life insurance sales, companies should focus on investing in both direct and intermediary channels.

Figure 13
ODDS RATIOS WITH 95% CONFIDENCE INTERVALS FOR LIFE INSURANCE



3.2 HEALTH INSURANCE MODELING

For health insurance, we applied a similar approach by running logistic regression with the candidate predictors. Table 7 displays the regression results. The overall model exhibits a pseudo R-squared of 13.2%, indicating that the model fit is solid and these predictors are collectively significant in explaining the variance in health insurance purchase decisions.

Table 7
HEALTH INSURANCE PURCHASE REGRESSION OUTPUT

	Coefficient	Significance
Constant	-4.65	***
Age	-0.01	***
Sex	0.12	**
Marital Status	0.22	***
Working Status	0.13	***
Residential Status	0.25	***
Area Type	0.26	**
Income Level	0.02	ns
Education Level	0.06	*
Insurance Knowledge	0.24	***
Direct	1.97	***
Intermediary	2.10	***
Other	1.77	***
Pseudo R-squared		13.6%

It is observed that several predictors display distinctly different influences on the purchase of health insurance compared to life insurance. Age is a negative predictor for health insurance with a coefficient of -0.01. Although the magnitude of this coefficient is small, its direction contrasts with life insurance, where the coefficient is positive at 0.01. The pattern observed suggests that as individuals age, their propensity to purchase health insurance increases, but this trend plateaus and slightly declines upon reaching the age of 42. Sex presents another difference, with a

coefficient of 0.12 for health insurance, indicating that women are more likely to purchase health insurance, whereas for life insurance, the trend is reversed.

Similar to life insurance, marital status (0.22), working status (0.13), and residential status (0.25) are all significant positive predictors for health insurance. This suggests that individuals who are married, employed, and own their properties are more likely to purchase health insurance. When comparing individual coefficients, the coefficient for residential status in health insurance (0.25) is lower than in life insurance (0.34), indicating that residential status has a more significant influence on life insurance decisions.

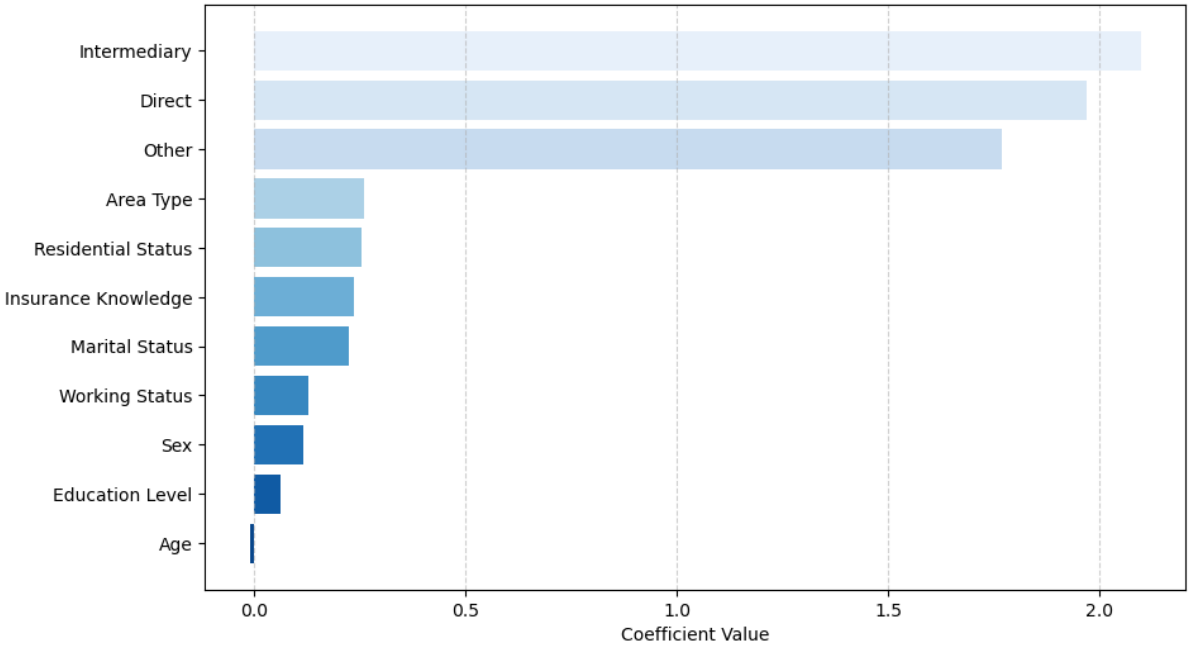
The educational level, with a coefficient of 0.06 at 5% significance level, suggests that higher educational attainment is correlated with a greater inclination towards purchasing health insurance, whereas it is not a significant predictor for life insurance. Insurance knowledge, with a coefficient of 0.24, indicates that as knowledge increases, it is associated with more health insurance purchases. Interestingly, in the previous section on life insurance, insurance knowledge was a significant predictor, while education level was not.

Income does not significantly impact health insurance purchase, similar to the findings in the life insurance model. This lesser influence can be attributed to the global scale of the analysis, where income's predictive power varies across different markets due to distinct environmental factors.

Figure 14 displays the results of a logistic regression analysis, showing that purchasing methods such as 'Direct', 'Intermediary', and 'Other' are also strong predictors for health insurance purchases. This suggests that health insurance purchasing channels are quite important in helping people acquire health insurance coverage.

Figure 14

LOGISTIC REGRESSION SIGNIFICANT COEFFICIENTS FOR HEALTH INSURANCE



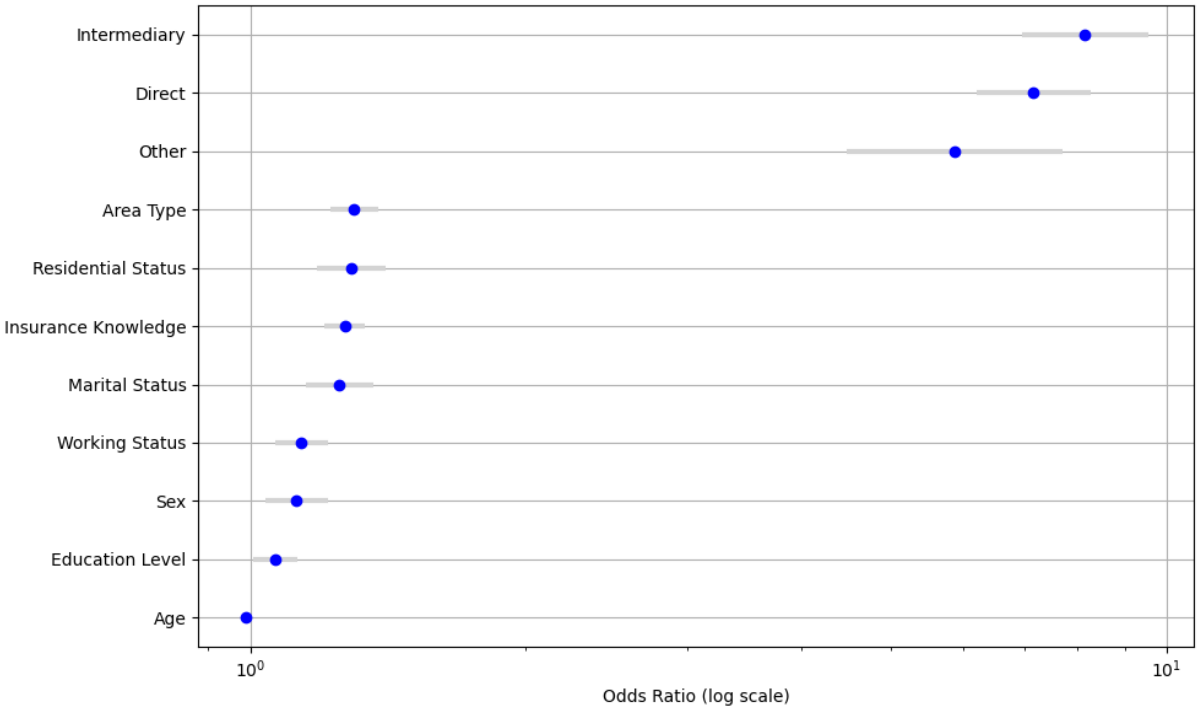
The VIF values for each significant variable in the model are below 10, as shown in Table 8. This indicates that the risk of multicollinearity is not significant, further validating the effectiveness and strong predictive influence of each variable on health insurance purchases within the model.

Table 8
VARIANCE INFLATION FACTOR RESULT FOR HEALTH INSURANCE

Feature	VIF
Age	1.23
Sex	1.03
Marital Status	1.23
Working Status	1.15
Residential Status	1.05
Area Type	1.08
Education Level	1.06
Insurance Knowledge	1.15

The odds ratios and their 95% confidence intervals for each predictor are shown in Figure 15. Similar to the modeling for life insurance, factors such as insurance knowledge, residential status, working status, and marital status exhibit an odds ratio above 1. The education level now emerges as a positive influencer, and sex is also a positive predictor, while age is a negative one, though the magnitude is small. When comparing the purchasing methods, the confidence intervals for 'Other' are much wider than those for 'Intermediary' and 'Direct' purchases, revealing that sales are more frequently conducted through direct and intermediary channels.

Figure 15
ODDS RATIOS WITH 95% CONFIDENCE INTERVALS FOR HEALTH INSURANCE



Section 4: Machine Learning Models

In this section, we analyze recent purchasing behaviors from a commercial marketing analytics perspective. The primary aim is to enhance the economic logistic regression models by adding depth and exploring more nuanced marketing and commercial factors that influence recent purchasing decisions.

4.1 MODEL DEVELOPMENT

To predict whether an individual has recently purchased any type of insurance (mortality, health, or AD&D) within the last two years, we examine all potential predictors listed in Table 9. This includes demographic variables from the logistic regression in Section 3, as well as additional lifestyle and health factors. Specifically, we consider practices of healthy living, exercise frequency, dietary habits, mental health and stress levels, and sleep patterns. Furthermore, we explore other potential influences on recent purchases, such as comfort levels with engaging on online insurance platforms and previous insurance claims history.

Table 9
LIST OF FEATURES

Category	Feature	Description
Demographic Information	age	Age of the individual
	sex	Sex of the individual
	education	Education level
	smoking	Smoking status
	marital_status	Marital status
	children	Number of children
	residential_status	Type of residence (own, rent, etc.)
	work_status	Employment status (employed, unemployed)
	area_type	Type of area (urban, rural, etc.)
Knowledge and Awareness	life_health_knowledge	Knowledge about life and health insurance
	risky	Engagement in risky behaviors
Lifestyle & Health	wearable	Usage of wearable technology
	health_app	Usage of health-related apps
	healthy_living	Practices of healthy living
	sleep	Sleep patterns
	steps	Daily physical activity level
	exercise	Exercise frequency
	diet	Dietary habits
	mental_health	Status of mental health
	stress_anxiety	Levels of stress or anxiety
Other Factors	new_online	Engagement with online insurance platforms
	claim	History of insurance claims

With a target rate of 45.2%, indicating that a product was purchased within the last two years, we employ an advanced gradient boosting model, XGBoost, for binary classification. We partition our data using a train-test split, with 30% of the data reserved for testing. Table 10 summarizes the evaluation metrics of the model. The model demonstrates a solid ability to predict recent insurance purchases, with a particularly strong AUC score indicating effective discrimination between purchasers and non-purchasers. It correctly predicts whether an individual has recently purchased insurance 70.26% of the time.

Table 10
XGBOOST CLASSIFIER MODEL SUMMARY

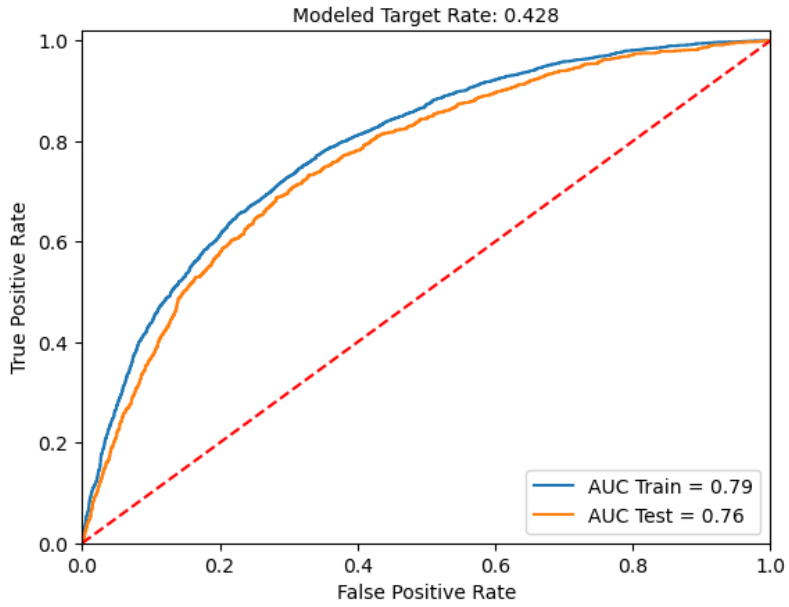
Metric	Value
Accuracy	0.7026
Precision	0.6593

Recall	0.6185
F1 Score	0.6383

The performance of our model, depicted by the Receiver Operating Characteristic (ROC) curve in Figure 16, yields an AUC (Area Under the Curve) of 0.76. This score demonstrates the model's good ability to distinguish between individuals who have and have not recently purchased insurance.

Figure 16

ROC CURVE



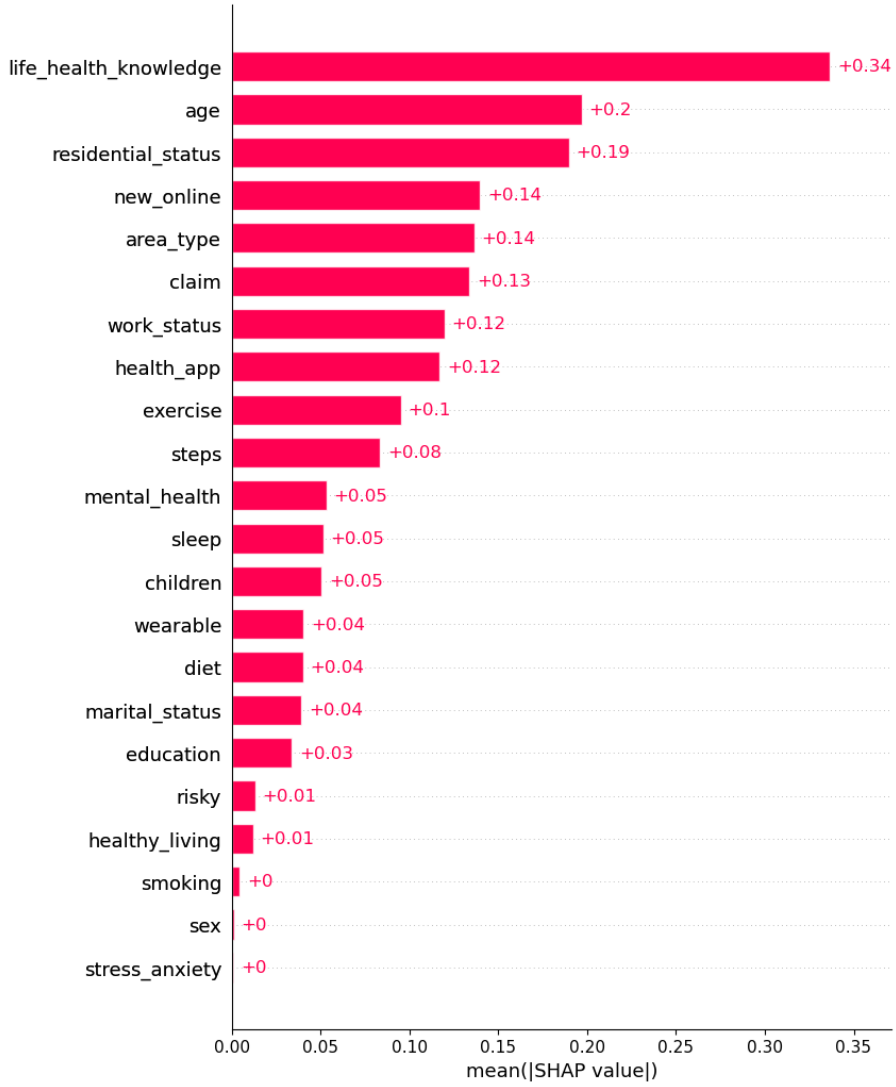
4.2 FEATURE INFLUENCE AND SHAP INSIGHTS

We further examine the SHapley Additive exPlanations (SHAP) values, which illustrate the individual contribution of each feature to the final prediction in high-dimensional data. These values allow us to compute the impact of each feature independently and then aggregate them. Table 11 summarizes the rankings of these SHAP values, with further illustrations provided in Figure 17.

Table 11
SHAP VALUES

Feature	Importance
life_health_knowledge	0.337
age	0.197
residential_status	0.190
new_online	0.140
area_type	0.137
claim	0.134
work_status	0.120
health_app	0.117
exercise	0.095
steps	0.083
mental_health	0.053
sleep	0.052
children	0.051
wearable	0.040
diet	0.040
marital_status	0.039
education	0.034
risky	0.013
healthy_living	0.012
smoking	0.005
sex	0.001
stress_anxiety	0.001

Figure 17
RANKED INFLUENCE OF PREDICTIVE FEATURES BY SHAP VALUE



The top influential features in the model, which align with some variables identified in the logistic regression model, include:

'Life_health_knowledge ': This is the most influential feature, indicating that an individual's knowledge about life and health insurance significantly impacts their purchasing decision. The higher the knowledge, the more likely they are to purchase insurance.

'Age': The second most important feature suggests that the age of an individual plays a substantial role in insurance decisions. Typically, as age increases, insurance needs and preferences might change.
'Residential_status': This indicates that where a person lives (their residential environment) significantly affects their insurance purchasing behavior.

Other features like ‘new_online’, ‘area_type’, ‘claim’, ‘work_status’, and ‘health_app’ have moderate importance scores. This suggests they moderately influence an individual’s decision to purchase insurance. For instance, engagement with online platforms (‘new_online’) and having made previous insurance claims (‘claim’) can sway the decision to purchase.

Features such as ‘exercise’, ‘steps’, ‘mental_health’, and down to ‘children’ and ‘wearable’ show lower importance. While they do impact the decision-making process, their influence is less significant. ‘Diet’, ‘marital_status’, ‘education’, and especially ‘risky’, ‘healthy_living’, ‘smoking’, ‘sex’, and ‘stress_anxiety’ have the least impact. Their low importance scores suggest that these factors, while possibly relevant to an individual’s overall lifestyle, have minimal direct influence on their recent insurance purchasing decisions.

Compared to the logistic regression model, which predicts whether an individual has life and health insurance, the machine learning model classifier adopts a more high-dimensional approach to investigate recent purchases. Some predictors, such as the level of knowledge about life and health insurance, age, residential status, work status, and area type, are significant variables in determining an individual’s propensity to purchase insurance. However, recent purchases are more associated with openness to engaging with new online insurance platforms, indicating an embrace of new technology among recent purchasers, who are also more likely to use health apps.

To differentiate between existing insurance holders and recent purchasers, we examine SHAP plots for interactions among variables. Additionally, we plot the top features with SHAP values greater than 0.1.

Figure 18 highlights the influence of age on the recent acquisition of life and health insurance products. The plot suggests a trend where younger individuals, represented on the left side with positive SHAP values, are more inclined to make recent insurance purchases. The color gradient within the scatter plot corresponds to varying levels of life and health insurance knowledge, reinforcing that those with greater knowledge are more likely to engage in recent purchases. This trend is particularly pronounced among younger individuals, who display both a higher likelihood of recent purchases and a greater degree of insurance knowledge. Conversely, older individuals with higher knowledge might not appear as prominently in recent purchase data, potentially because they have longstanding insurance policies that were not acquired recently.

Figure 19 indicates that individuals who prioritize cost savings and convenience are more inclined to purchase insurance from companies that operate online and are relatively new. The level of knowledge about life and health insurance does not seem to significantly affect this preference. In contrast, individuals who favor purchasing from a physical branch exhibit a pattern where a higher level of knowledge enhances the predictive power. This suggests that branches could offer training and education to improve customer engagement. Meanwhile, those with less knowledge display a tendency to trust established brands. These individuals show a positive predictive preference for established brands compared to new online alternatives, underscoring the significant influence of brand reputation on their decisions to purchase insurance.

Figure 18

SHAP PLOT OF AGE AND LIFE_HEALTH_KNOWLEDGE ON RECENT INSURANCE PURCHASE

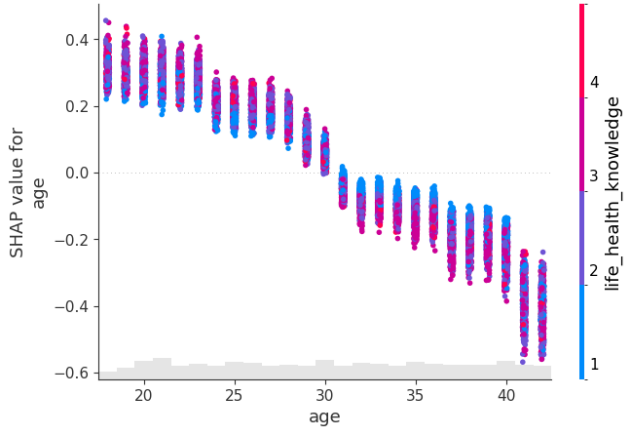


Figure 19

SHAP PLOT OF AGE AND NEW_ONLINE ON RECENT INSURANCE PURCHASE

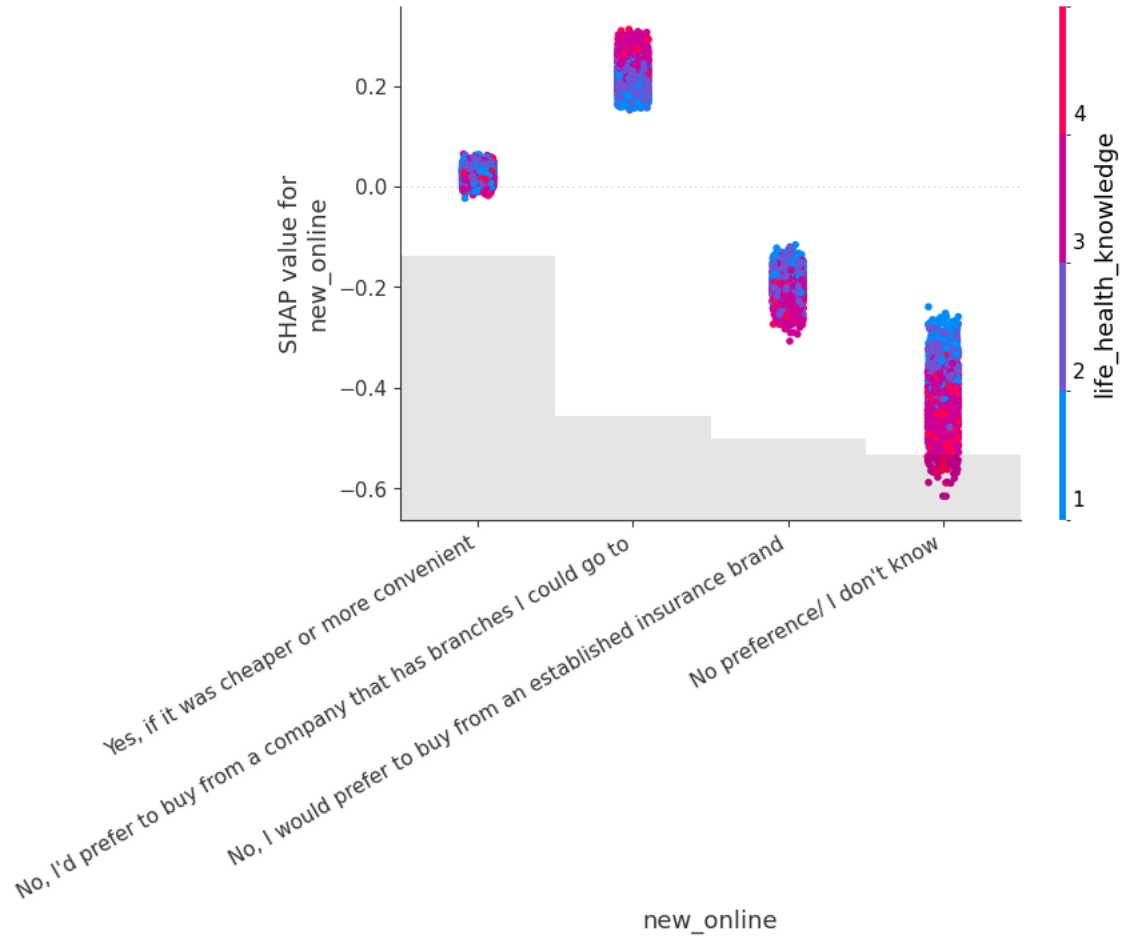


Figure 20 suggests that individuals residing in major cities are more likely to have recently purchased life and health insurance, particularly those who own property or are paying mortgages. In rural and suburban settings, the trend of recent purchases is typically more pronounced among younger generations who often live with parents or rent,

and usually do not yet own property. The impact of living in a rural versus an urban area also seems to be a significant factor, as recent purchases are more commonly observed in major cities.

Figure 21 suggests that individuals who have previously made claims are more likely to have recently purchased insurance policies, particularly those who are younger than 35 years old. This trend might be due to the recognition of the value of insurance coverage following experiences that led to claims. The model's predictive power decreases with older age groups. Younger individuals with higher claims are perceived as more likely to purchase insurance, possibly because they are at a stage in life where the relevance of insurance is increasingly apparent.

Figure 20

SHAP PLOT OF AGE AND NEW_ONLINE ON RECENT INSURANCE PURCHASE

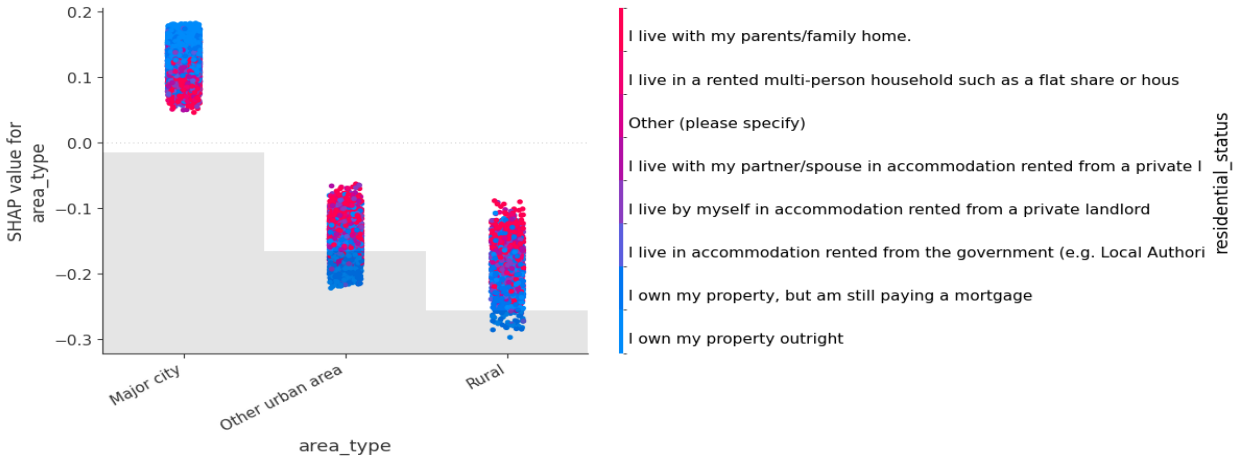


Figure 21

SHAP PLOT OF AGE AND CLAIM EXPERIENCE ON RECENT INSURANCE PURCHASE

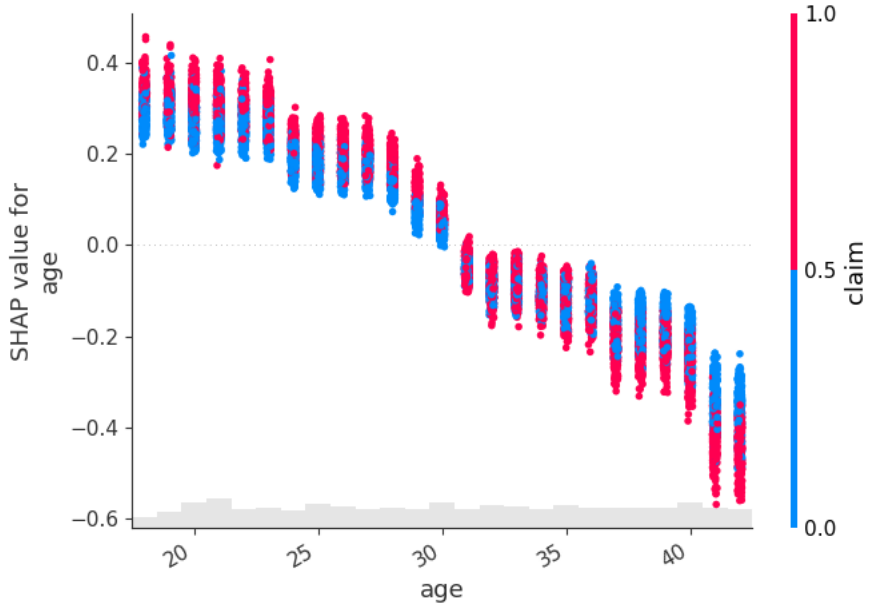


Figure 22 indicates that individuals who work full-time are the most likely to have recently made purchases, a finding that aligns with the results from the logistic regression analysis presented in Section 3. People who are unemployed seem less likely to make recent purchases and may not be the target market for insurers.

Figure 22

SHAP PLOT OF AREA TYPE AND WORK STATUS ON RECENT INSURANCE PURCHASE

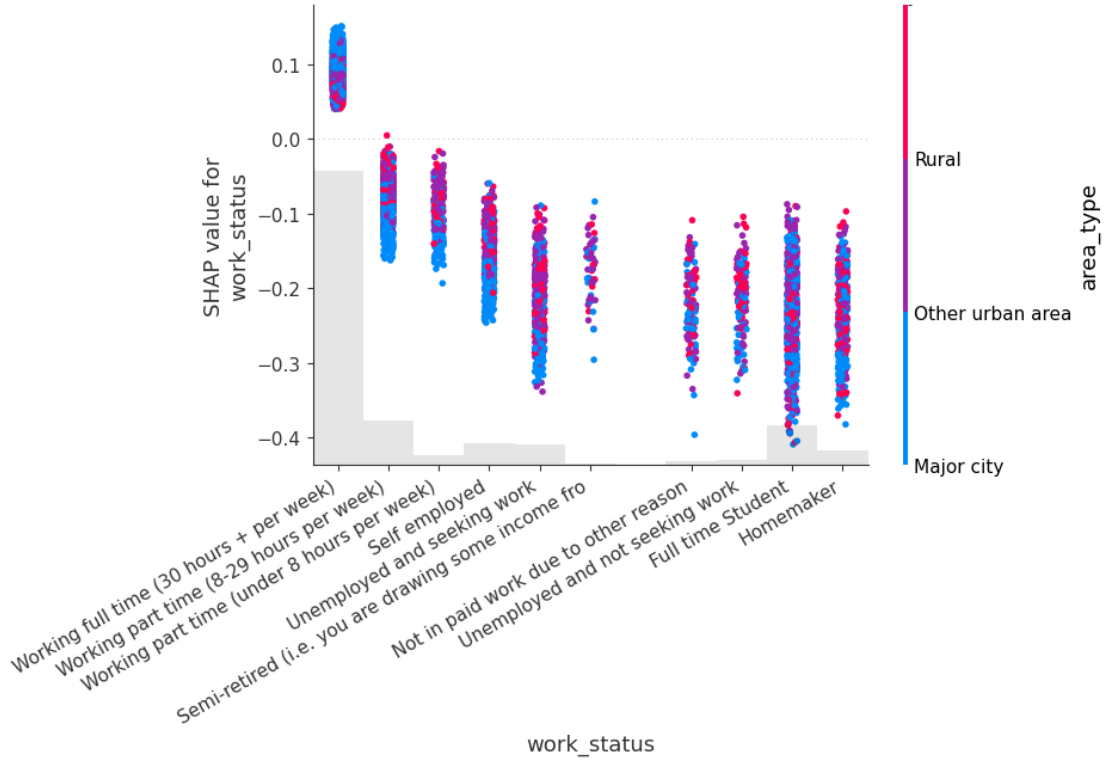
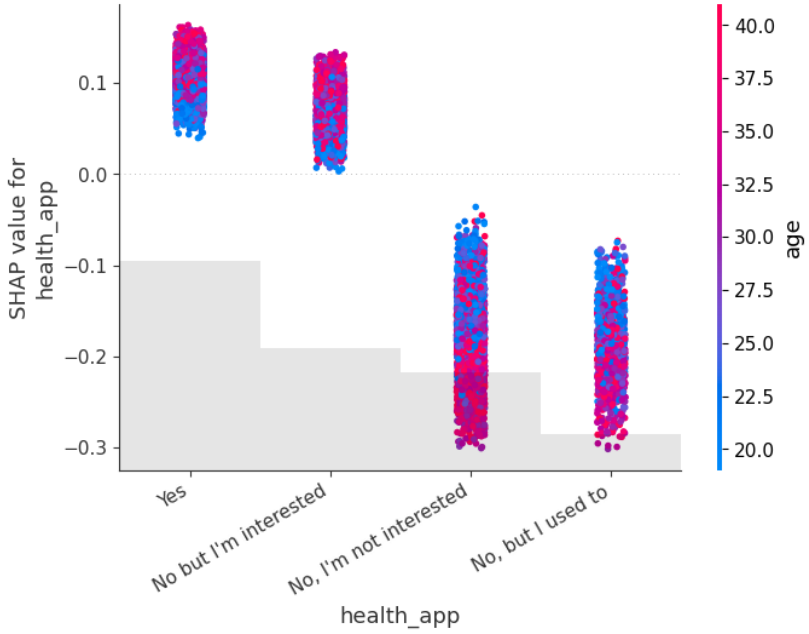


Figure 23 illustrates that individuals currently using health applications are more likely to have recently purchased life and health insurance, especially those around 40 years of age compared to younger age groups. This indicates that the middle-aged demographic, demonstrating an interest in their health, may be more proactive in obtaining insurance coverage. People who are not currently using but are interested in health apps also tend to show a positive trend toward recent insurance purchases. In contrast, those who are not interested in health apps, as well as those who used to use them but no longer do, are less likely to be recent purchasers of insurance, suggesting that engagement with health apps may correlate with the propensity to invest in insurance.

Figure 23

SHAP PLOT OF AGE AND HEALTH APP ON RECENT INSURANCE PURCHASE



Section 5: Conclusions

This report investigates the primary predictors influencing the purchase of life and health insurance and what drives recent purchases. Traditional economic regression models and analytical machine learning models are used to understand market behaviors. Substantial market observation data from 22 markets across six regions, Africa, Asia, Europe, Oceania, South America, and North America, with a focus on Gen Z and Millennials aged 18 to 42, lead to the following conclusions.

The analysis reveals several factors that significantly influence an individual's likelihood of holding mortality, health, or AD&D disability insurance:

- Insurance Knowledge: Greater knowledge of insurance products is linked to a higher probability of being insured.
- Marital Status: Married individuals show a stronger propensity to purchase life insurance compared to their single counterparts.
- Working Status: Being employed or semi-employed is a strong predictor, with such individuals more likely to hold life insurance.
- Residential Status: Owning property is associated with a higher likelihood of insurance coverage, indicating a link between asset ownership and the procurement of insurance.
- Area Type: Residents of major cities are more likely to purchase insurance.
- Age: An upward trend in life insurance purchases is observed with increasing age. In contrast, the likelihood of acquiring health insurance decreases with age.
- Sex: Men are more likely to purchase life insurance, whereas women show a higher inclination toward health insurance.

Both direct and intermediary purchasing methods are significant sales channels for life and health insurance products. The recent purchase behavior within the past two years has also been modeled using machine learning to validate the relationships and interactions between predictors. Key observations include that recent purchases are more likely to be made by young individuals with a high level of knowledge about life and health insurance. Cost-sensitive consumers, regardless of their knowledge level, prefer new online insurance providers, while those with greater knowledge are inclined to buy from physical branches. This implies that in-person branch training for insurance literacy may be more effective than online training, suggesting a gap in the comprehensiveness of digital servicing.

Furthermore, the likelihood of recent insurance purchases is higher among city residents, especially property owners or mortgage payers. Younger people with prior claims experience are more apt to purchase insurance, recognizing its value from their past experiences. There is a correlation between the use of health applications and recent insurance purchases, particularly among the middle-aged demographic. This indicates a forward-thinking approach to health and insurance coverage among this group.

Although various markets may exhibit different purchasing behaviors and patterns, with economic development status and general education levels varying significantly across markets, the overarching trend suggests that younger people, poised to be the main purchasing power in the coming decade, are more inclined to embrace online technology platforms. It should be noted that one limitation of the study is that our analysis focuses exclusively on data for individuals aged 18-42, encompassing Gen Z and Millennials. Consequently, the features and trends identified may not be generalizable to younger or older populations.

In conclusion, as we anticipate future trends in the insurance markets, comprehending the purchasing behaviors of younger generations is critical. By embracing technology-driven platforms, focusing on urban centers where this demographic is typically more tech-savvy, and integrating health applications more deeply into their services,

insurers can gain a significant strategic edge in the life and health insurance sectors. Adapting to these shifts will enable insurers to not only meet but exceed the expectations of the next wave of policyholders, thereby securing a prosperous future for the industry.

About The Society of Actuaries Research Institute

Serving as the research arm of the Society of Actuaries (SOA), the SOA Research Institute provides objective, data-driven research bringing together tried and true practices and future-focused approaches to address societal challenges and your business needs. The Institute provides trusted knowledge, extensive experience and new technologies to help effectively identify, predict and manage risks.

Representing the thousands of actuaries who help conduct critical research, the SOA Research Institute provides clarity and solutions on risks and societal challenges. The Institute connects actuaries, academics, employers, the insurance industry, regulators, research partners, foundations and research institutions, sponsors and non-governmental organizations, building an effective network which provides support, knowledge and expertise regarding the management of risk to benefit the industry and the public.

Managed by experienced actuaries and research experts from a broad range of industries, the SOA Research Institute creates, funds, develops and distributes research to elevate actuaries as leaders in measuring and managing risk. These efforts include studies, essay collections, webcasts, research papers, survey reports, and original research on topics impacting society.

Harnessing its peer-reviewed research, leading-edge technologies, new data tools and innovative practices, the Institute seeks to understand the underlying causes of risk and the possible outcomes. The Institute develops objective research spanning a variety of topics with its strategic research programs: aging and retirement; actuarial innovation and technology; mortality and longevity; diversity, equity and inclusion; health care cost trends; and catastrophe and climate risk. The Institute has a large volume of topical research available, including an expanding collection of international and market-specific research, experience studies, models and timely research.

Society of Actuaries Research Institute
8770 Bryn Mawr Ave., Suite 1000
Chicago, IL 60631
www.SOA.org